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09/754,486	01/03/2001	Stephen Temple	27754/X254A	4903

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EXAMINER
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DANIELS, MATTHEW J

ART UNIT	PAPER NUMBER
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1732

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 09/754,486	Applicant(s) TEMPLE ET AL.	
	Examiner Matthew J. Daniels	Art Unit 1732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 February 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) 9,23-25,31 and 34-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 36 and 37 is/are allowed.
- 6) ☒ Claim(s) 9,23-25 and 31 is/are rejected.
- 7) ☒ Claim(s) 34 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 9, 34, and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As to Claim 9, there is no antecedent basis for “said...planar reflecting surfaces”. The second and third surfaces are described only as “additional beam reflecting surfaces” and not as “planar” reflecting surfaces. There is no antecedent basis for the claimed “said...planar reflecting surfaces”.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Rejections over Nishiwaki in view of GB 2 262 253 are withdrawn.
3. Claims 9, 23-24 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No. 5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of GB 2 262 253 A.

Nishiwaki *et al.* ('250) teach the basic claimed apparatus and process for forming nozzles in a nozzle plate for an inkjet print head including, splitting a laser beam (3) into a plurality of secondary beams using a system of prisms and a flyeye lens (4), hence introducing a divergence into the secondary beams, whereas the origin of divergence being apart from the point where beam splitting occurs (see Figure 2), followed by a process of recombining and directing the secondary beams, using a convergent lens, toward a single aperture of a mask as defined by a light transmissible portion as shown in Figure 5, whereas the resulting light spot is made to coincide to with the light transmissible portion (aperture) of the mask (see col. 4, lines 54-56).

Regarding claims 9, 23-24 and 31, Nishiwaki *et al.* ('250) does not teach directing the laser beam to a first reflecting surface and then to at least two additional beam reflecting surfaces that are rotating as an assembly such as to invert the beam in a collinear direction. Shei *et al.* ('238) teach an optical homogenizer system including a first, second and third reflecting means (discrete members) that rotate (130) (see col.4, lines 53-57). It should be noted that because the optical homogenizer system reshapes and homogenizes the beam in a circular fashion that said homogenizer rotates. Further, it should be noted that because the optical homogenizer system of Shei *et al.* ('238) includes a similar structure as claimed, specifically three rotating reflecting surfaces placed at an angle to the incoming beam, then it is submitted that the outgoing laser beam of Shei *et al.* ('238) is inverted. Therefore, it would have been obvious for one of ordinary skill in the art to have provided an optical homogenizer system including a first, second and third reflecting means that rotate as taught by Shei *et al.* ('238) in the process of Nishiwaki *et al.* ('250) because, Shei *et al.* ('238) specifically teach that such a homogenizer reshapes and homogenizes the beam in a circular fashion, hence improving the quality of the resulting nozzles.

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It should be noted that the apparatus of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) teach a nozzle plate substrate and a beam homogenizer.

Further regarding claims 9, 23-24 and 31, Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) do not teach forming a reverse tapered hole (directing said beam at said substrate such that said beam first impinges upon the face of the nozzle plate in which said nozzle outlet is formed...nozzle inlet is larger in diameter than nozzle outlet). GB 2 262 253 A teaches a laser drilling process including rotating a laser beam about the polar axis of a fixed spherical lense by rotating an optical assembly that reflects the laser beam between an outer mirror (11) and an inner mirror (14) such that a reversed tapered hole is formed (see Abstract). GB 2 262 253 also teaches first, second, and third planar reflecting surfaces (Fig. 4). Further, it is noted that the optical assembly in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238), hence the laser beam, is also rotated. Therefore, it would have been obvious for one of ordinary skill in the art, in view of the teachings of GB 2 262 253 A, that upon rotation of the laser beam assembly as taught by GB 2 262 253 A in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) to have obtained a reverse tapered hole, because of known advantages that a reverse tapered hole provides such as, allowing the nozzle ink inlet to match the shape of an ink channel in the printhead and also because, forming both tapered and reverse tapered holes provides for a more versatile process. Further, it is noted that GB 2 262 253 A specifically teaches that rotation of the laser beam forms a reverse tapered hole, whereas Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) teach rotating of the optical assembly and hence, rotating the laser beam, thereby suggesting that the process and apparatus of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and in further view of GB 2 262 253 A teaches a reverse tapered hole.

4. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No. 5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of GB 2 262 253 A and Daly (US Patent No. 4,316,074).

Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A teach the basic claimed process as described above.

Regarding claim 25, although Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A teach reflective means, Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A do not specifically teach dielectric mirrors. Daly ('074) teaches the use of high reflectance dielectric mirrors (see col. 6, lines 30-35). Therefore, it would have been obvious for one of ordinary skill in the art to have used the high reflectance dielectric mirrors of Daly ('074) in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A because, Daly ('074) teaches that such mirrors have a 99% reflectance rate, whereas the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A requires reflective means for homogenizing the beam, hence improving process quality.

5. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No. 5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of GB 2 262 253 A and Hizny (US Patent No. 5,048,938).

Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A teach the basic claimed process as described above.

Regarding claim 35, although Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A does not teach the use of a second mask interposed between the

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first mask (8) and the beam converging lens (10), the use of multiple masks to process a laser beam is well known in the art as evidenced by Hizny ('938) which teaches that "cleaning" of the beam occurs by using a spatial filter (mask) (see col. 1, lines 10-15). Therefore, it would have been obvious for one of ordinary skill in the art to have interposed a second mask (spatial filter) as taught by Hizny ('938) in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A because, Hizny ('938) specifically teaches that using a spatial filter (mask) allows "cleaning" of the laser beam prior to its impingement on the target, hence improving product quality and also because Hizny ('938) specifically teaches that the use of spatial filters is well known.

6. Claims 9, 23-24 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No. 5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of Applicants' Admitted prior Art (APA).

Nishiwaki *et al.* ('250) teach the basic claimed apparatus and process for forming nozzles in a nozzle plate for an inkjet print head including, splitting a laser beam (3) into a plurality of secondary beams using a system of prisms and a flyeye lens (4), hence introducing a divergence into the secondary beams, whereas the origin of divergence being apart from the point where beam splitting occurs (see Figure 2), followed by a process of recombining and directing the secondary beams, using a convergent lens, toward a single aperture of a mask as defined by a light transmissible portion as shown in Figure 5, whereas the resulting light spot is made to coincide to with the light transmissible portion (aperture) of the mask (see col. 4, lines 54-56).

Regarding claims 9, 23-24 and 31, Nishiwaki *et al.* ('250) does not teach directing the laser beam to a first reflecting surface and then to at least two additional beam reflecting surfaces

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that are rotating as an assembly such as to invert the beam in a collinear direction. Shei *et al.* ('238) teach an optical homogenizer system including a first, second and third reflecting means (discrete members) that rotate (130) (see col.4, lines 53-57). It should be noted that because the optical homogenizer system reshapes and homogenizes the beam in a circular fashion that said homogenizer rotates. Further, it should be noted that because the optical homogenizer system of Shei *et al.* ('238) includes a similar structure as claimed, specifically three planar rotating reflecting surfaces placed at an angle to the incoming beam, then it is submitted that the outgoing laser beam of Shei *et al.* ('238) is inverted. Therefore, it would have been obvious for one of ordinary skill in the art to have provided an optical homogenizer system including a first, second and third reflecting means that rotate as taught by Shei *et al.* ('238) in the process of Nishiwaki *et al.* ('250) because, Shei *et al.* ('238) specifically teach that such a homogenizer reshapes and homogenizes the beam in a circular fashion, hence improving the quality of the resulting nozzles. It should be noted that the apparatus of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) teach a nozzle plate substrate and a beam homogenizer.

Further regarding claims 9, 23-24 and 31, Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) do not teach forming a reverse tapered hole (directing said beam at said substrate such that said beam first impinges upon the face of the nozzle plate in which said nozzle outlet is formed...nozzle inlet is larger in diameter than nozzle outlet). However, Applicants' Admitted Prior Art (APA) teaches that it is well known to form a reverse tapered hole by controlling the divergence of the beam, which in turn determines the angle of taper of the nozzle: (see specification, page 1, lines 18-19). Further, APA teaches that it is well known to use a second mask to reduce the angle of divergence in one plane of the beam relative to another, and thereby



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obtain a reverse tapered hole (nozzle). Therefore, it would have been obvious for one of ordinary skill in the art to control the divergence of the beam as taught by APA in the process and apparatus of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) because APA specifically teaches that it is well known to form a reverse tapered hole, hence providing for an improved product by allowing the nozzle ink inlet to match the shape of an ink channel in the printhead and also because, forming both tapered and reverse tapered holes provides for a more versatile process.

7. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No. 5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of Applicants' Admitted prior Art (APA) and Daly (US Patent No. 4,316,074).

Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of APA teach the basic claimed process as described above.

Regarding claim 25, although Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of APA teach reflective means, Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of APA do not specifically teach dielectric mirrors. Daly ('074) teaches the use of high reflectance dielectric mirrors (see col. 6, lines 30-35). Therefore, it would have been obvious for one of ordinary skill in the art to have used the high reflectance dielectric mirrors of Daly ('074) in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of APA because, Daly ('074) teaches that such mirrors have a 99% reflectance rate, whereas the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of GB 2 262 253 A requires reflective means for homogenizing the beam, hence improving process quality.

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8. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiwaki *et al.* (US Patent No. 5,263,250) in view of Shei *et al.* (US Patent No. 5,569,238) and in further view of Applicants' Admitted prior Art (APA) and Hizny (US Patent No. 5,048,938).

Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of APA teach the basic claimed process as described above.

Regarding claim 35, although APA teach the concept of using multiple masks (see specification, page 1, lines 18-20), Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of APA do not specifically teach the use of a second mask interposed between the first mask (8) and the beam converging lens (10). However, the use of multiple masks to process a laser beam is well known in the art as evidenced by Hizny ('938) which teaches that "cleaning" of the beam occurs by using a spatial filter (mask) (see col. 1, lines 10-15). Therefore, it would have been obvious for one of ordinary skill in the art to have interposed a second mask (spatial filter) as taught by Hizny ('938) in the process of Nishiwaki *et al.* ('250) in view of Shei *et al.* ('238) and further view of APA because, Hizny ('938) specifically teaches that using a spatial filter (mask) allows "cleaning" of the laser beam prior to its impingement on the target, hence improving product quality and also because, Hizny ('938) specifically teaches that the use of spatial filters is well known.

***Allowable Subject Matter***

9. Claims 36-37 are allowed.

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10. Claim 34 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Response to Arguments*

11. Applicant's arguments filed 12 February 2007 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

a) Eye surgery methods disclosed by the references are not pertinent (analogous). The beam homogenizer of Shei is a functional equivalent of the optical integrator disclosed in Nishiwaki.

There is no motivation for the combination.

b) References from different fields may only be applied in combination where they are reasonably pertinent to the particular problem faced by Applicant. Turner (GB 2 262 253) is not analogous as forming tapered nozzles in wing skin material, where the fluid dynamics are different than in an ink jet.

c) GB 2 262 253 discloses the use of four reflecting surfaces.

d) Hizney couples the spatial filter closely to the laser, which would be impossible if it were to be interposed between the mask and the beam converging means.

e) According to Applicant's admitted prior art, a reversed tapered hole may be formed by controlling the divergence of a single beam, which determines the angle of taper of the nozzle.

12. These arguments are not persuasive for the following reasons:

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a) In response to Appellants' argument that the teachings of Shei *et al.* ('238) and GB 2 262 253 A are nonanalogous art (see pages 9-10 and 13-14 of the Appeal Brief filed 6/13/2005), it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Shei *et al.* ('238) teach an optical homogenizer system including a first, second and third reflecting means (discrete members) that rotate (130) (see col.4, lines 53-57) and homogenizes the beam, thereby obtaining a uniform beam having a uniform energy distribution. GB 2 262 253 A teaches a laser drilling process including rotating a laser beam about the polar axis of a fixed spherical lense by rotating an optical assembly that reflects the laser beam between an outer mirror (11) and an inner mirror (14) such that a reversed tapered hole is formed (see Abstract). It is noted that Applicants state that the primary reference of Nishiwaki *et al.* ('250) teach forming an inkjet nozzle by achieving "uniformity of illumination" (see pages 13-14 of the Appeal Brief filed 6/13/2005). Hence, Shei *et al.* ('238) teach a process and apparatus that results in a laser beam having a uniform energy distribution, whereas GB 2 262 253 A teaches improving the versatility of the process by allowing drilling of preformed surfaces in which the undersurface is not accessible. Therefore, the teachings of Shei *et al.* ('238) and GB 2 262 253 A are deemed to be reasonably pertinent to the particular problem with which the applicant was concerned. Furthermore, it is submitted that it desirable to achieve a more uniform laser beam energy distribution when laser machining in order to have control over the machining process and be able to repeat said machining process.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, motivation for the combination was provided and does not appear to be particularly argued, thus it is still believed to be valid.

b) Turner is directed at drilling of reverse tapered holes by means of a laser beam (page 1, paragraph 1). It is submitted that Turner is directed at laser drilling of reverse taper holes generically without regard to any particular substrate or material. Thus, it is both within Applicant's field of endeavor and reasonably pertinent to the particular problem.

c) Rejections over Nishiwaki in view of GB 2 262 253 are withdrawn as there is no inversion produced by the four reflecting surfaces of GB 2 262 253.

d) It is submitted that this argument is drawn to the order of steps of process steps disclosed by the prior art. However, it is generally considered to be prima facie obvious to rearrange process steps disclosed by the prior art. Second, it is submitted that it would be obvious to spatially filter the beam at any point where it is needed to "clean up" the beam.

e) Applicant's admitted prior art provides teachings of the particular mask. Nishiwaki teaches the splitting of the beam, and this argument appears to argue against Applicant's admitted prior art separately or individually. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the

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rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJD 5/14/07



CHRISTINA JOHNSON  
SUPERVISORY PATENT EXAMINER  
5/14/07